US006874148B1

(12) **United States Patent** (10) Patent No.: **US 6,874,148 B1**
Richardson et al. (45) **Date of Patent:** **Mar. 29, 2005**

(54) **SYSTEM AND METHOD FOR EXPORTING A GRAPHICAL PROGRAM TO A SHARED LIBRARY**

(75) Inventors: **Greg Richardson**, Round Rock, TX (US); **Steve Rogers**, Austin, TX (US)

(73) Assignee: **National Instruments Corporation**, Austin, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 525 days.

(21) Appl. No.: **09/594,226**

(22) Filed: **Jun. 14, 2000**

(51) Int. Cl.^{7} **G06F 3/00**; G06F 9/44; G06F 9/46; G06F 13/00
(52) U.S. Cl. **719/328**; 719/331; 717/107
(58) Field of Search 719/310, 311–316, 719/328–331; 717/100–113, 162–167, 133, 144, 157; 709/331, 332; 345/762, 763, 771, 967

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,146,593 A	*	9/1992	Brandle et al.	709/328
5,163,130 A	*	11/1992	Hullot	345/763
5,860,004 A	*	1/1999	Fowlow et al.	717/109
5,883,639 A	*	3/1999	Walton et al.	345/473
6,064,812 A		5/2000	Parthasarathy et al.	
6,102,965 A		8/2000	Dye et al.	
6,189,138 B1	*	2/2001	Fowlow et al.	717/107
6,351,778 B1	*	2/2002	Orton et al.	709/310
6,389,588 B1	*	5/2002	Wadhwa et al.	717/106

OTHER PUBLICATIONS

Munro, Writing DLLs for Windows using Visual Basic, part 1, PC Magazine, v11, n11,p. 379(6).*
LabVIEW Function Reference Manual, Aug. 1993 Edition, pp 10–11 and 10–12.
LabVIEW Code Interface Reference Manual, Dec. 1993.

* cited by examiner
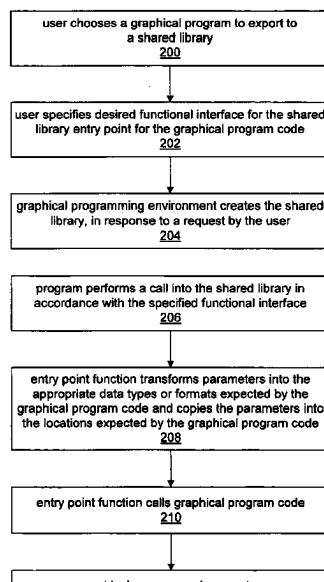
Primary Examiner—Meng-Al T. An
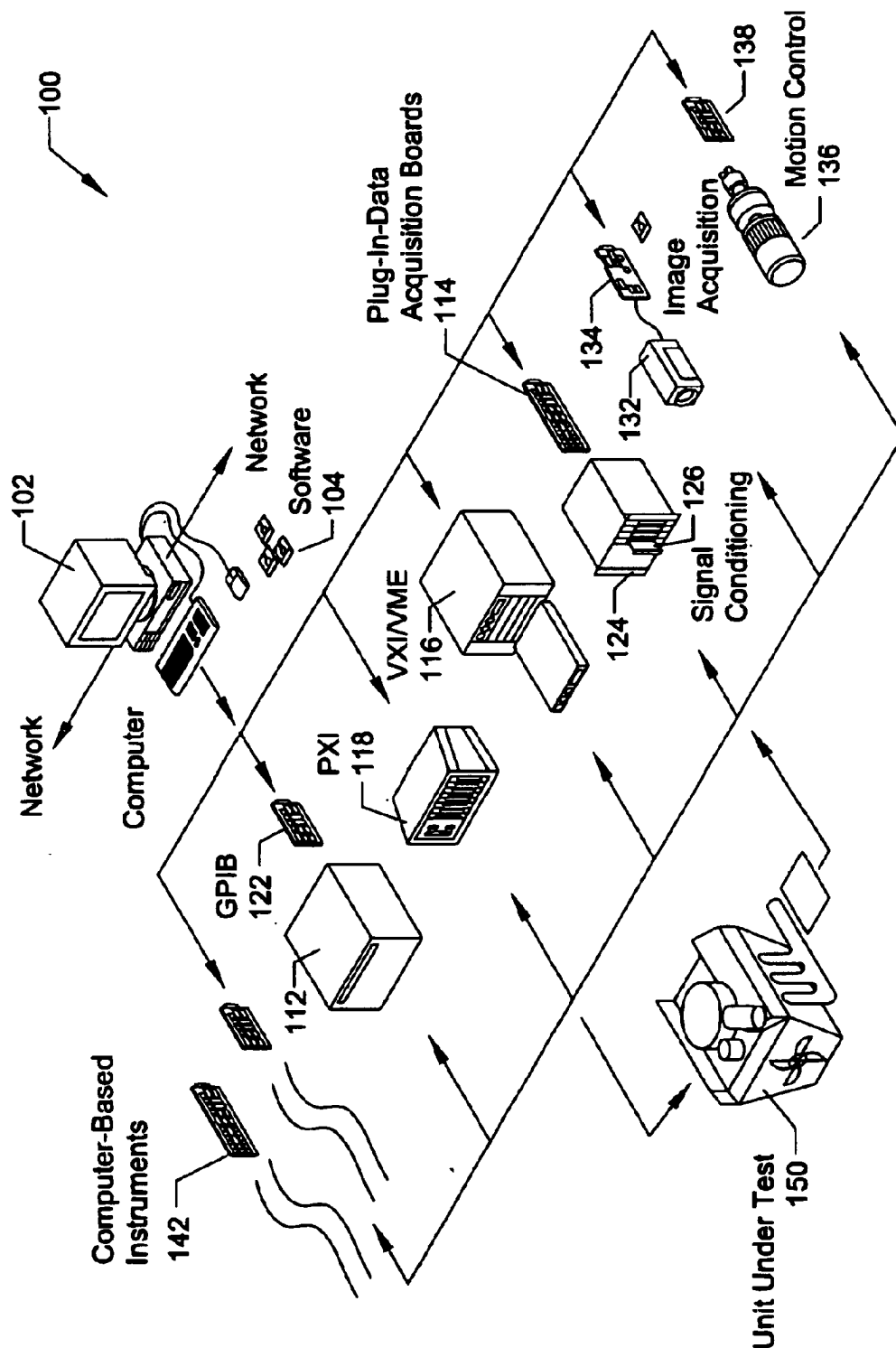Assistant Examiner—Diem Cao
(74) Attorney, Agent, or Firm—Meyertons Hood Kivlin Kowert & Goetzel, P.C.; Jeffrey C. Hood; Jason L. Burgess

(57) **ABSTRACT**

System and method for enabling a program to call into graphical program code via a shared library. A graphical programming system may export a graphical program to a shared library, such as a Windows Dynamic Link Library (DLL), Unix Shared Library, etc. A program, e.g. a text-based program, may then use the shared library to call into the graphical program. Graphical programs or subprograms may have associated inputs or outputs of various data types. When creating a shared library, a functional interface specifying parameterized versions of these inputs and outputs may be specified, either automatically or interactively. A program may then utilize this functional interface to construct an appropriate call into the shared library. A user interface enabling users to specify the mapping of graphical program inputs and outputs onto parameters of the functional interface is described. Multiple graphical programs or subprograms may be exported to a shared library. The shared library may include an entry point function associated with each graphical program or subprogram. When a program calls into the entry point associated with a particular graphical program, the entry point function may manipulate or copy the parameters passed by the calling program into a representation expected by the graphical program.

38 Claims, 11 Drawing Sheets

100

Network

Network

Computer

102

Network
Software
104

Plug-In-Data
Acquisition Boards
114

Computer-Based
Instruments
142

GPIB
122

PXI
118

VXI/VME
116

134

132

Image
Acquisition

Motion Control
136

138

124

Signal
126
Conditioning

112

Unit Under Test
150

FIG. 1A

160

Network

102

Network

Data Acquisition

Software
104

MMI/SCADA

Computer

Plug-In-Data
Acquisition
Boards

114

184

Serial

PLC
176

Fieldbus
172

PXI
118

134

Image
Acquisition

136

138

Motion
Control

132

170

FieldPoint

124

126

182

Signal
Conditioning

Stimulus
Control

150

Process

Temperature
Pressure
Flow

FIG. 1B

FIG. 2

user chooses a graphical program to export to
a shared library
200

user specifies desired functional interface for the shared
library entry point for the graphical program code
202

graphical programming environment creates the shared
library, in response to a request by the user
204

FIG. 3A

program performs a call into the shared library in
accordance with the specified functional interface
206

entry point function transforms parameters into the
appropriate data types or formats expected by the
graphical program code and copies the parameters into
the locations expected by the graphical program code
208

entry point function calls graphical program code
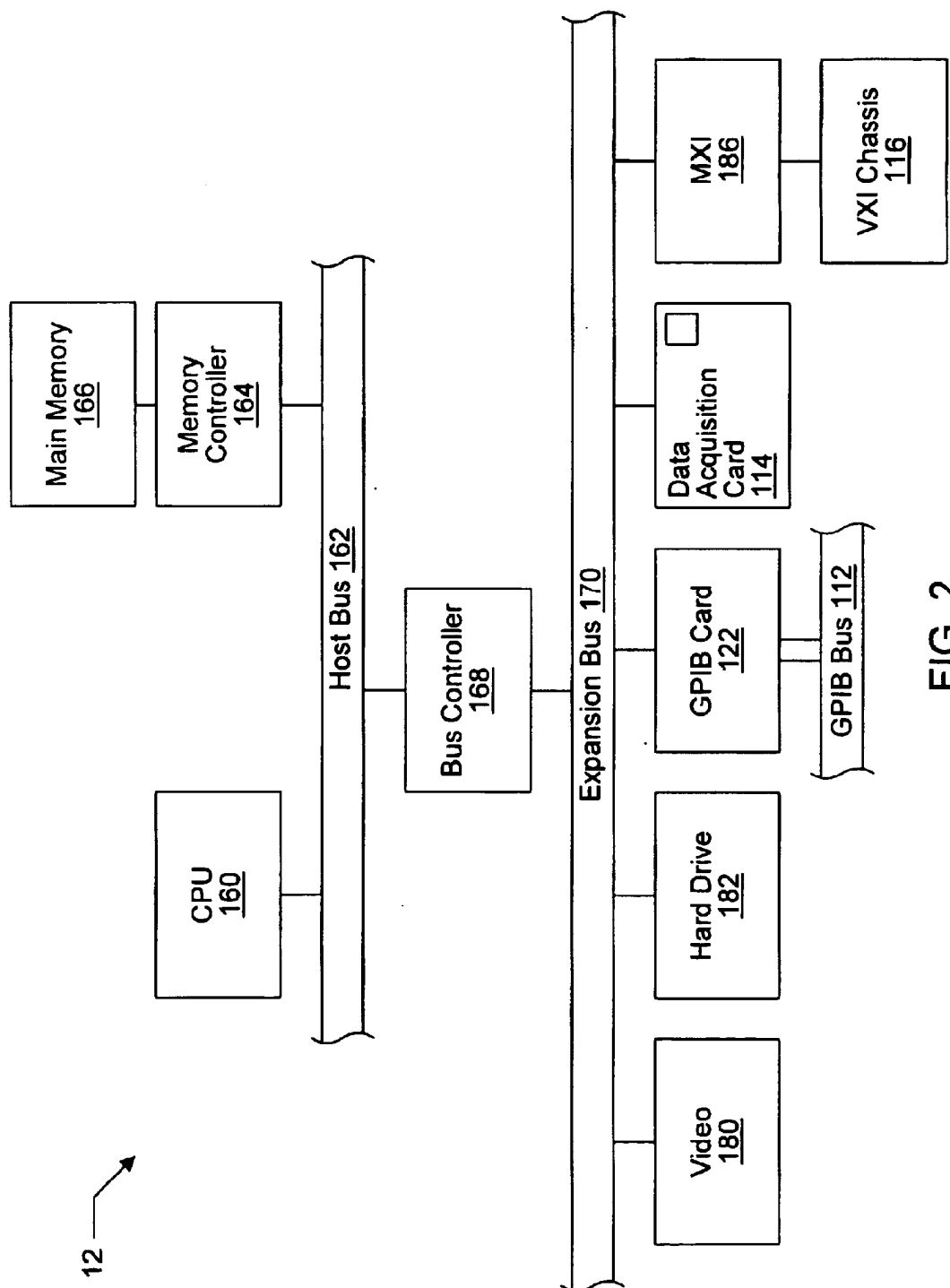210

graphical program code executes
212

FIG. 3B

DOCKET ALARM
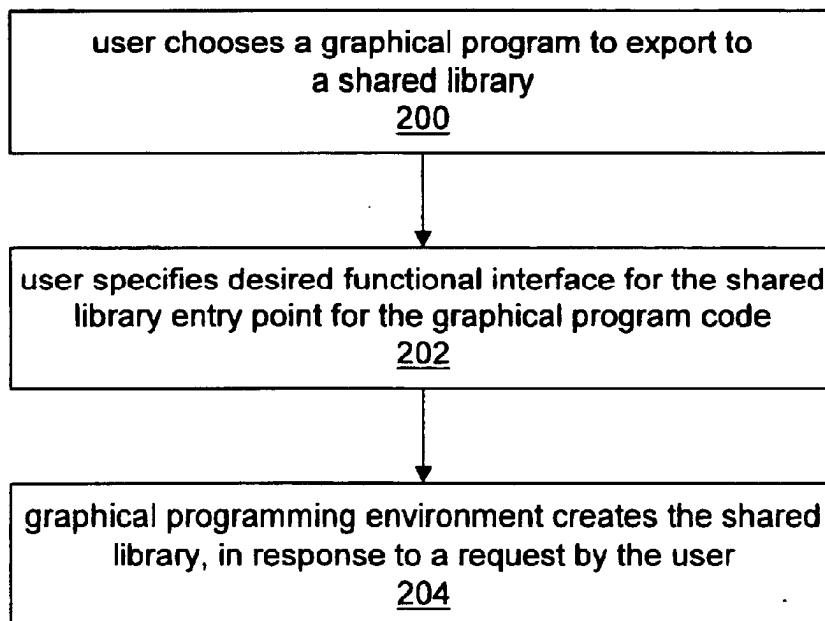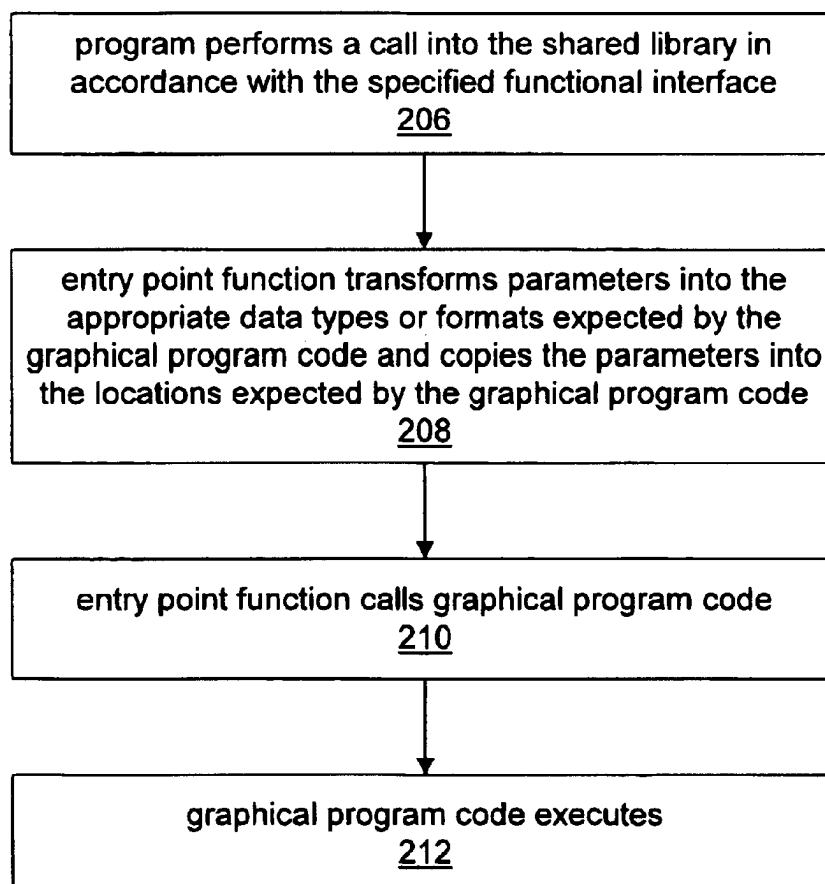
Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.

fastcase
Smarter legal research.